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Pulley assembly for lift hoist rope - has rope from lift motor traction sheave passed via diverting pulleys round four sheaves under car and three fixed pulleys to anchorage (Eng)

KONE ELEVATOR GMBH 92.09.18 92FI-004207

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93.09.17 93EP-115025 R(AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE)

The lift hoist rope (3) from the counterweight in the shaft wall is directed round a traction sheave on the lift motor which is located at the side of the shaft. From the traction sheave the rope is passed round two fixed diverting pulleys (4a, 4b) to a pulley (5a) which is the first of four (5a-d), fixed under the car.

The rope is then routed to pulley (5b), over (4c) fixed to the shaft wall, and back to pulleys (5c) and (5d) under the car. The rope end is finally attached to an anchorage (6) on the shaft wall, giving a 1 to 4 speed and load ratio at the traction sheave.

ADVANTAGE - The reduced tensile stresses in the hoist rope allow the design of heavier lifts without resorting to capital- and maintenance-costly hydraulic multi-cylinder installations with limited height capabilities. (5pp Dwg.No.1/3)

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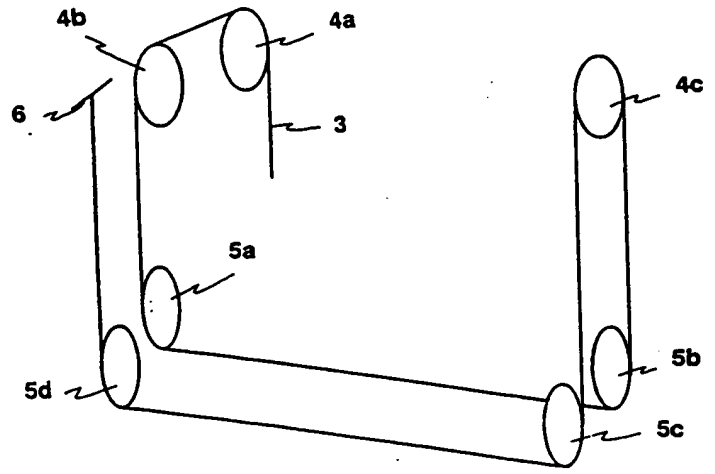

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(71) Applicant: **KONE Elevator GmbH**
Rathausstrasse 1
CH-6340 Baar(CH)

(72) Inventor: **De Jong, Johannes**
Kauhajoenkuja 1
SF-04430 Järvenpää(FI)

(74) Representative: **Zipse + Habersack**
Kemnatenstrasse 49
D-80639 München (DE)

(54) Rope arrangement for an elevator.

(57) Rope arrangement for an elevator comprising a hoisting machine (1,10,11) and hoisting ropes (3) moving the elevator car, in which rope arrangement the hoisting ropes (3) of the elevator run over rope pulleys (5a-5d) placed under the elevator car (8). The hoisting ropes (3) run over the rope pulleys so that the transmission ratio between the speed of the elevator car (8) and the rotational speed of the hoisting machine is at least 1:4.

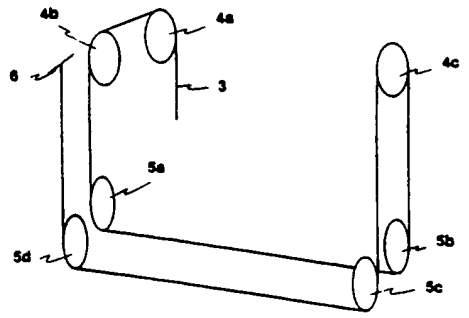

FIG. 1

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The present invention relates to an elevator rope arrangement according to the introductory part of claim 1.

At present, elevators are used in which the hoisting ropes run via pulleys placed below the elevator car. Such solutions can be used especially when the hoisting machine of the elevator is located at the side of the shaft. In the case of rope pulleys placed below the elevator car, the transmission ratio currently used is 1:2. In this context, transmission ratio refers to the speed of the elevator car in relation to the rope speed.

In large and heavy elevator applications, hydraulic elevators are used. These often have a multistage lifting cylinder. Especially elevators for heavy use and those with a large lifting height need multistage lifting cylinders. However, such lifting cylinders are very expensive and their maintenance is also expensive and complicated. Because of the buckling, the cylinders have a relatively low lifting height limit.

The object of the present invention is to eliminate the drawbacks of prior-art techniques and to achieve a rope elevator solution designed to replace, in particular, heavy hydraulic elevators. According to the characterization part of claim 1, the elevator rope arrangement of the invention is characterized in that the hoisting ropes run by the underside of the elevator car so that the transmission ratio is at least 1:4.

The solution according to the invention provides advantages especially in the case of heavier elevators. It enables small geared elevator machines to be used instead of large gearless machines with a transmission ratio of 1:2. Moreover, when the rope pulley arrangement of the invention is used, the elevator car is completely balanced and the rope force is only 1/4 or less of the weight of the car.

With respect to hydraulic elevators, a considerably lighter and cheaper solution is achieved.

In the following, the invention is described in detail by the aid of an example by referring to the attached drawings, in which

Fig. 1 presents the rope arrangement according to the invention.

Fig. 2 presents the rope arrangement for the elevator machine.

Fig. 3 presents a rope elevator according to the invention.

In the rope arrangement of the invention as presented in fig. 1, the hoisting ropes 3 are passed via four pulleys 5a - 5d placed under the elevator car at the points of a rectangle. In addition, the ropes pass round three diverting pulleys 4a - 4c mounted on the wall of the elevator shaft above the elevator car. By using an arrangement where the ropes run via four pulleys under the elevator car as illustrated by fig. 1, a transmission ratio of 1:4 between the car speed and the speed of rotation of the traction sheave will be achieved.

The ropes 3 run from the traction sheave 1 of the hoisting motor (fig. 2) to one 2a of the two diverting pulleys of the machine and further to the first overhead diverting pulley 4a mounted on the wall of the elevator shaft. From here, the ropes 3 go to the second overhead diverting pulley 4b and further to the first rope pulley 5a mounted under the elevator car. Next, the ropes 3 pass via the second rope pulley 5b, which is aligned with the first one in the running direction of the rope, to the third overhead diverting pulley 4c. From this pulley they run via the third and fourth rope pulleys 5c and 5d to a rope anchorage 6 in the wall.

The other rope branch goes from the traction sheave 1 (fig. 2) via the other diverting pulley 2b to the counterweight. The counterweight rope arrangement can be implemented independently of the car rope arrangement, so it will not be described here in detail.

Fig. 3 three illustrates an elevator car 8 which has rope pulleys 5a - 5d mounted under it as described above and moves along guide rails 9 in an elevator shaft 7. Mounted on the wall of the elevator shaft are overhead diverting pulleys 4a - 4c. The elevator machine consists of a hoisting motor 10 placed at the side of the shaft 7, a gear 11, a traction sheave 1 and a diverting pulley 2a of the hoisting motor. Fig. 3 also shows the counterweight 12.

The rope pulleys 5a - 5d are arranged under the elevator car 8 at an angle relative to the centre line (dotted broken line) going through the diverting pulleys 4a and 4b. Line 4a - 4b and the centre line of the rope pulleys 5a - 5d under the car 8 - this latter line being represented by the dotted broken line passing between said pulleys via the guide rails 9 - form an angle which may vary between 25° - 155° (in fig. 3, 90°).

It is obvious to a person skilled in the art that different embodiments of the invention are not restricted to the example described above, but that they may instead be varied within the scope of the following claims.

Claims

1. Rope arrangement for an elevator comprising a hoisting machine (1,10,11) and hoisting ropes (3) moving the elevator car, in which rope arrangement the hoisting ropes (3) of the elevator run over rope pulleys (5a-5d) placed under the elevator car (8), **characterized** in that the hoisting ropes (3) run over the rope pulleys so that the transmission ratio between the speed of the elevator car (8) and the rotational

speed of the hoisting machine is at least 1:4.

2. Elevator rope arrangement according to claim 1, **characterized** in that it comprises diverting pulleys (4a-4c) placed on the wall of the elevator shaft (7), the hoisting ropes being directed to run via said diverting pulleys from the hoisting machine to the rope pulleys (5a-5d) and between two collateral rope pulleys (5b,5c), said diverting pulleys being placed above the elevator car or at least above the rope pulleys under it.

3. Elevator rope arrangement according to claim 1 or 2, **characterized** in that the transmission ratio is 1:4, that the number of rope pulleys (5a-5d) is four, and that the rope pulleys (5a-5d) are arranged under the elevator car (8) at an angle relative to the line going through two diverting pulleys (4a,4b) placed on the same wall of the shaft so that the line (4a-4b) going through the diverting pulleys and the centre line of the rope pulleys (5a-5d) under the car (8) form an angle which varies in the range 25° - 155°.

4. Elevator rope arrangement according to any one of the preceding claims, **characterized** in that the transmission ratio is 1:4, that the number of rope pulleys (5a-5d) is four, and that the rope pulleys are arranged under the elevator car substantially at the points of a rectangle.

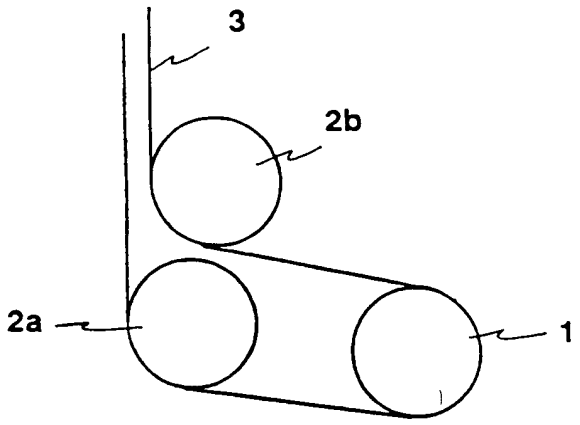

FIG. 2

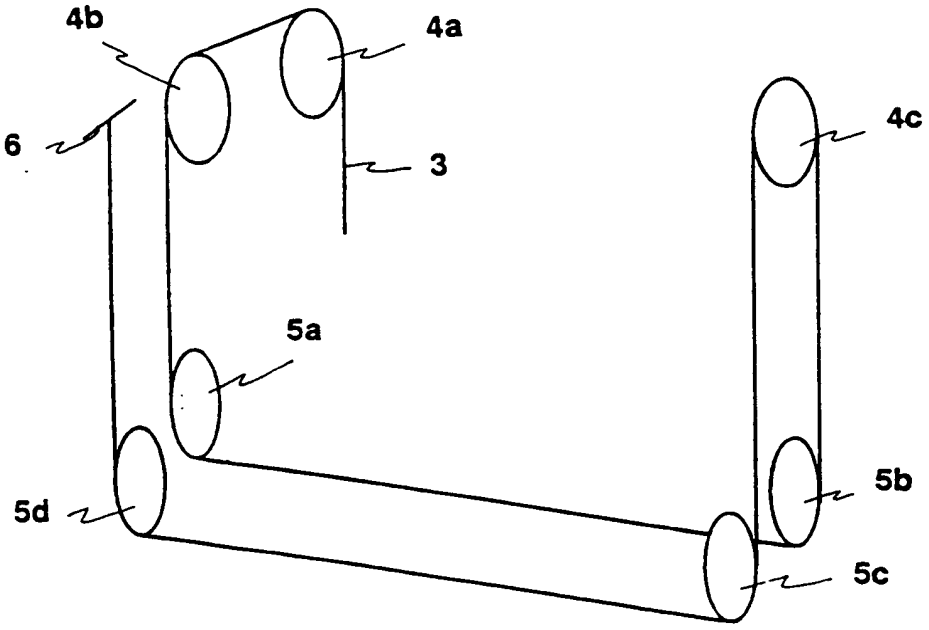

FIG. 1

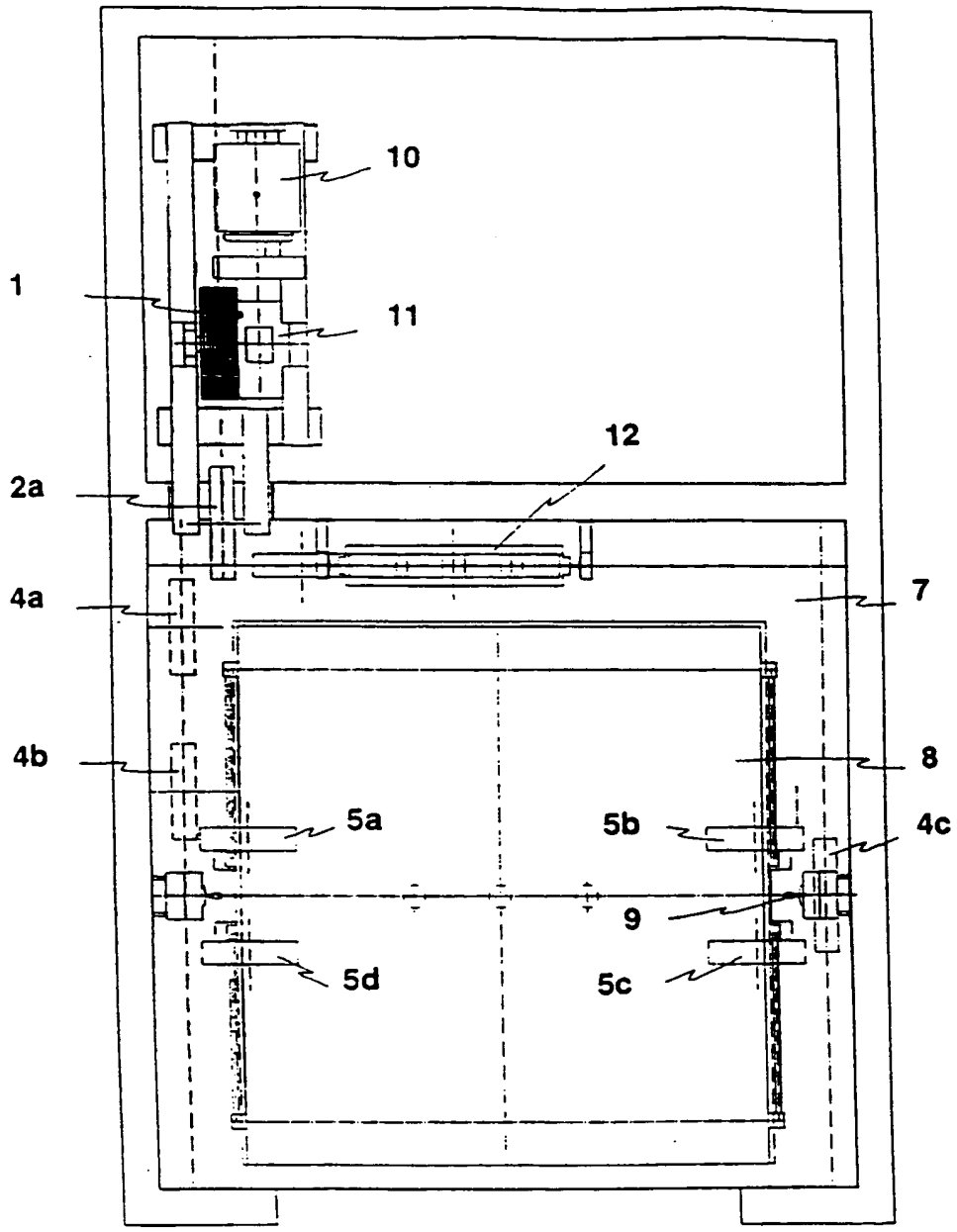

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93115025.4

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE - A - 2 523 345 (KONE) * Fig. 3,4 * --	2-4	B 66 B 11/04
A	DE - B - 1 032 496 (J. TEPPER) * Fig. 1,2 * --	2-4	
A	US - A - 4 830 146 (NAKAMURA) * Fig. 6 * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 66 B 7/00
B 66 B 9/00
B 66 B 11/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	17-12-1993	NIMMERRICHTER

CATEGORY OF CITED DOCUMENTS

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